International Journal of Science, Environment and Technology, Vol. 3, No 3, 2014, 872 – 880
ISSN 2278-3687 (O)

A PIONEERING STUDY ON THE SPIDER (ARACHNIDA: ARANEAE) FAUNA OF KUMARAKOM BIRD SANCTUARY

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Abstract: Kumarakom Bird Sanctuary, a lush patch of land is situated in the eastern coast of Lake Vembanad in Kottayam district of Kerala. Spiders were collected for seven months from November, 2007 to May, 2008; bimonthly. The specimens collected were analyzed to study the general population trend and the guild structure. The seventy four species in 51 genera belonging to 19 families clearly indicate a high diversity of spiders distributed in the study area. Of these, Salticidae was the dominant family with 18 species. The spiders collected during the study were classified into 7 ecological guilds based on their foraging mode. They are orb weavers (31%), stalkers (30%), Space web builders (14%), foliage runners (9%), ground runners (8%), ambushers (5%), and sheet web builders (3%).
Keywords: Kumarakom, Spiders, Population, Dominance, Guild.

INTRODUCTION

Kumarakom Bird Sanctuary (KBS) (9°37'46.97''N & 76°25'25.56''E/ 44 ft alt) a green patch of land with mangrove forests criss-crossed with channels connected to the nearby backwater which is famous for its wetland vegetation and birdlife. This area that encompasses the Kerala Tourism Development Corporation (KTDC) Complex is 90.199 acres (36.4869 hectares) in extent and forms a part of the Baker Estate**.** The Kumarakom Bird sanctuary is situated at Kavanattinkara in Kottayam District of Kerala on the western side of the Kumarakom - Vechoor road on the southern banks of the river Kavanar, a branch of the Meenachil river system. This area is known for its avian fauna which includes a variety of local resident birds and a number of migratory birds. Many of them use this place as the breeding ground.

Mangroves have got a crucial role to supporting the ecosystem with a number of wetland medicinal plants. Among the longest mangrove belt (ten species of mangroves) of Kerala,

*Received Apr 08, 2014 * Published June 2, 2014 * www.ijset.net*

eight species were recorded from the Kumarakom Tourist Complex namely *Avicennia officinalis. Bruguiera gymnorrhiza, Rhizophora apiculata, Rhizophora mucronata, Sonneratia caseolaris and Kandelia candel.* Of these, three are found only at Kumarakom.

Among the seventeen species of Mammals identified from the Kumarakom Bird Sanctuary, Smooth-coated Otter (*Lutrogale perspicillata*) is the most important species. KBS forms the largest heronry in Kerala, based on number as well as species diversity. It is found that two globally near threatened bird species like Darter (*Anhinga melanogaster)* and Black headed Ibis (*Threskiornis melanocephalus)* are breeding in this heronry. Prof. K K Neelakantan, well – known ornithologist reported about 3000 to 4000 Night Herons in breeding, in the two marshy areas of the north-western part of the Estate. Out of 483 species all over Kerala, a total of 88 species of birds under 33 families and 14 orders are recognized from KBS. Water birds belonging to five families, namely *Anhingidae, Phalcrocoracidae, Ardeidae, Threskiornithidae* and *Rallidae* under two orders – *Ciconiiformes* and *Gruiformes*, are found to breed in the Bird sanctuary.

KBS hosts a large colony of Indian Flying Fox of more than 5000 individuals. Five species of bats are identified from this area. Fifty species of minor vertebrates, representing 10 orders and 29 families are reported from the sanctuary. The number of species of fishes, amphibians and reptiles are 34, 5, and 14 respectively. About 45 species of butterfly and 40 species of Dragonflies and Damselflies are recorded from the Kumarakom Bird Sanctuary. Almost all faunal groups such as birds, bats, fishes, amphibians, reptiles, butterflies, dragonflies etc. of this area have been investigated by researchers. But still the spider fauna of this area are remaining unexplored. So this is a pioneering attempt to explore the spider diversity distributed in Kumarakom bird sanctuary.

MATERIALS AND METHODS

The investigation was carried out for a period of 7 months from November, 2007 to May, 2008. Spiders were collected twice in a month in sessions starting early in the morning (8.00 am) up to the noon (12.30 pm). An all out search method was used for collecting the spiders. For a systematic collection, the entire place of the sanctuary was divided into six areas and the plants were thoroughly examined for the possible spiders. Collection was conducted mainly by handpicking and beating methods. Aerial sampling of spiders was done by searching leaves, branches, tree trunks, and spaces in between, from knee height up to maximum overhead arm's reach and transferring them into collection bottles. Spiders from height above were mainly collected by beating method in which vegetation was shaken with

hands or beaten with a one meter long stick and catching the falling spiders on an inverted umbrella held below and transferring them to collection bottles.

Ground dwelling spiders were searched exploring leaf litter, under surface of logs, rocks, and plant surfaces below knee. Specimens collected were transported to the laboratory. Small specimens were photographed with the help of a stereo zoom camera attached microscope (Leica-MS5). Comparatively large specimens were photographed in the field itself before collection. Specimens were preserved in 75% alcohol with proper labeling of locality, date, and other notes of importance for further studies. Preserved specimens were examined under a stereo zoom microscope (Leica-MS5) in the laboratory for taxonomic identification. Spiders were identified up to species level with the help of available literature.

Ecological characteristics relating to foraging manner, nature of web, prey species, microhabitat use, site tenacity and daily activity pattern at family level were subjected to guild classification. Output of the analysis was organized into graphical form. The spider guild classification was composed according to the families collected during the study. Designation of spider guild was based on the ecological characteristic known for the family.

RESULTS

A total of 74 spider species coming under 51 genera under 19 families were collected from the study site (Table 1). Of the 19 families sampled, the family Salticidae was found rich in number of species. This family was represented by 18 species. The next dominated family was Aranedae, possessed 13 species. Theridiidae and Tetragnathidae were the others with higher diversity having 10 and 7 species respectively. A total of 4 species were reported from Lycosidae and Oxyopidae. Family Miturgidae possessed 3 species. The families like, Linyphiidae, Pisauridae and Sparassidae were with 2 species each. The remaining families such as Clubionidae, Corinnidae, Hersilidae, Nephilidae, Oonopidae, Psechridae, Scytodidae, Thomisidae, Uloboridae having only one species (Fig.1). This study revealed that spider fauna in the study area is qualitatively rich.

Spider population of the study area represents the population trend taking 5 dominant species of these spiders viz, *Argiope pulchella* (Family: Araneidae), *Cyrtophora cirticola* (Family: Araneidae), *Clubiona drassodes* (Family: Clubionidae), *Leucauge pondae* (Family: Tetragnathidae), *Tetragnatha mandibulata* (Family: Tetragnathidae) (fig. II).

The spiders collected during the study were classified into 7 ecological guilds based on the foraging mode of the spiders (Figure - III). Among the 19 families of spiders collected, majority of families (31%) belong to “orb weavers” category. The second dominant guild

constituted the “stalkers” (30%). Space web builders (14%), foliage runners (9%), ground runners (8%), ambushers (5%), and sheet web builders (3%) are the other ecological guilds.

DISCUSSION

The study revealed that KBS is qualitatively rich in spiders with 74 species of spiders belonging to 51 genera coming under 19 families (Fig.1). It indicates that 60 families identified so far from Kerala, nearly 32% families were recognized from KBS. Diversity generally increases when a greater variety of habitat types were present . The study area is endowed with different types of habitats such as grassland, mangroves, coconut plantation, rubber trees and shrubs. This may be the reason for the species richness. Riechert and Lockley, also noted this trend among spider populations.

ACKNOWLEDGEMENTS

A big thanks to Fr. Prasanth Palackkappillil CMI Principal and Fr. A. J Savience CMI former Principal Sacred Heart College, Thevara, Cochin for providing all facilities for this work. We are also indebted to Dr. P. A Sebastian, Dr. A.V Sudhikumar and Mr. Pradeep M.S for rendering valuable help in identifying spiders. Financial help received from the Kerala State Council for Science, Technology and Environment (KSCSTE), Thiruvananthapuram, Kerala is gratefully acknowledged. Many thanks to the administrative authorities of Kumarakom Bird Sanctuary for giving permission for collecting specimens for the study.

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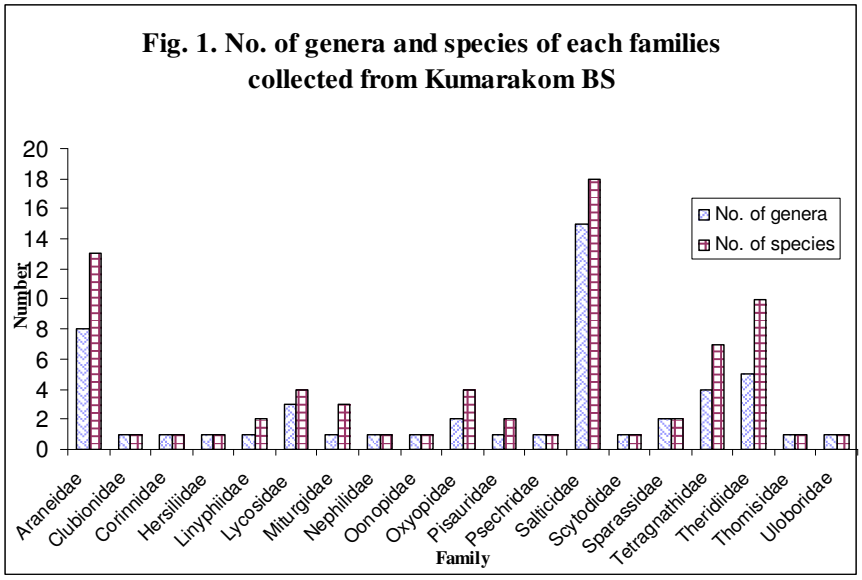
Table 1: Checklist of spiders collected from Kumarakom bird sanctuary

S. No.	Family/Genus/Species	
I.	Family: ARANEIDAE SIMON, 1895	
	1	*Araneus* spp.
	2	*Argiope anasuja* Thorell, 1887
	3	*Argiope pulchella* Thorell, 1881
	4	*Argiope* spp.
	5	*Porcataraneus bengalensis* Tikader, 1975
	6	*Cyclosa confraga* (Thorell, 1892)
	7	*Cyrtophora cicatrosa* (Stoliczka, 1869)
	8	*Cyrtophora citricola* (Forskal, 1775)
	9	*Cyrtophora moluccensis* (Doleschall, 1857)
	10	*Eriovixia laglaizei* (Simon, 1877)
	11	*Neoscona* spp.

	12	*Neoscona mukerjei* Tikader, 1980
	13	*Zygiella* spp.
II	Family: CLUBIONIDAE WAGNER, 1887	
	14	*Clubiona drassodes* O. P.Cambridge, 1874
III	Family: CORINNIDAE KARSCH, 1880	
	15	*Castianeira zetes* Simon, 1897
IV	Family: HERSILIIDAE THORELL, 1870	
	16	*Hersilia savignyi* Lucas, 1836
V	Family: LINYPHIIDAE BLACKWALL, 1859	
	17	*Linyphia* spp.
	18	*Linyphia urbasae* Tikader, 1970
VI	Family: LYCOSIDAE SUNDEVALL, 1833	
	19	*Hippasa agelenoides* (Simon, 1884)
	20	*Lycosa* spp.
	21	*Pardosa pseudoannulata* (Bosenberg & Strand, 1906)
	22	*Pardosa sumatrana* (Thorell, 1890)
VII	Family: MITURGIDAE SIMON, 1885	
	23	*Cheiracanthium* spp.
	24	*Cheiracanthium danieli* Tikader, 1975
	25	*Cheiracanthium melanostomum* (Thorell, 1895)
VIII	Family: NEPHILIDAE SIMON, 1894	
	26	*Herennia multipuncta* (Doleschall, 1859)
IX	Family: OONOPIDAE SIMON, 1890	
	27	*Opopaea* spp.
X		Family: OXYOPIDAE THORELL,1870
	28	*Oxyopes birmanicus* Thorell, 1887
	29	*Oxyopes quadridentatus* Thorell, 1895
	30	*Oxyopes shweta* Tikader, 1970
	31	*Peucetia viridana* (Stoliczka, 1869)
XI	Family: PISAURIDAE SIMON, 1890	

	32	*Pisaura* spp.
	33	*Dendrolycosa gitae* Tikader, 1970
XII	Family: PSECHRIDAE SIMON, 1890	
	34	*Fecenia protensa* Pocock, 1899
XIII	Family: SALTICIDAE BLACKWALL, 1841	
	35	*Bavia kairali* (Samson & Sebastian, 2004)
	36	*Brettus* spp.
	37	*Brettus albolimbatus* Simon, 1900
	38	*Carrhotus viduus* (C.L. Koch, 1846)
	39	*Chalcotropis* spp.
	40	*Hasarius adansoni* (Audouin, 1826)
	41	*Hyllus semicupreus* (Simon, 1885)
	42	*Menemerus bivittatus* (Dufour, 1831)
	43	*Myrmarachne plataleoides* (O.P.Cambridge, 1869)
	44	*Myrmarachne ramunni* Narayan, 1915
	45	*Phintella vittata* (C.L. Koch, 1846)
	46	*Plexippus paykulli* (Audouin, 1826)
	47	*Plexippus petersi* (Karsch, 1878)
	48	*Portia fimbriata* (Doleschall, 1859)
	49	*Ptocasius yashodharae* (Tikader, 1977)
	50	*Rhene danieli* Tikader, 1973
	51	*Telamonia dimidiata* (Simon, 1899)
	52	*Thiania bhamoensis* Thorell,1887
XIV	Family: SCYTODIDAE BLACKWALL, 1864	
	53	*Scytodes fusca* Walckenaer, 1837
XV	Family: SPARASSIDAE BERTKAU, 1872	
	54	*Heteropoda venatoria* (Linnaeus, 1767)
	55	*Thelcticopis* spp.
XVI	Family: TETRAGNATHIDAE MENGE, 1866	
	56	*Leucauge* spp.
	57	*Leucauge pondae* Tikader, 1970

	58	*Opadometa fastigata* (Simon, 1877)
	59	*Tetragnatha javana* (Thorell, 1890)
	60	*Tetragnatha mandibulata* Walckenaer, 1842
	61	*Tetragnatha viridorufa* Gravely, 1921
	62	*Tylorida* spp.
XVII	Family: THERIDIIDAE SUNDEVALL, 1833	
	63	*Achaearanea* spp.
	64	*Achaearanea durgae* Tikader, 1970
	65	*Achaearanea mundula* (L. Koch, 1872)
	66	*Argyrodes* spp.
	67	*Argyrodes argentatus* Cambridge, 1880
	68	*Argyrodes gazedes* Tikader, 1970
	69	*Chrysso argyrodiformis* (Yaginuma, 1952)
	70	*Theridion* spp.
	71	*Theridion manjithar* Tikader, 1970
	72	*Theridula angula* Tikader, 1970
XVIII	Family: THOMISIDAE SUNDEVALL, 1833	
	73	*Thomisus* spp.
XIX	Family: ULOBORIDAE THORELL, 1869	
	74	*Miagrammopes extensus* Simon, 1889



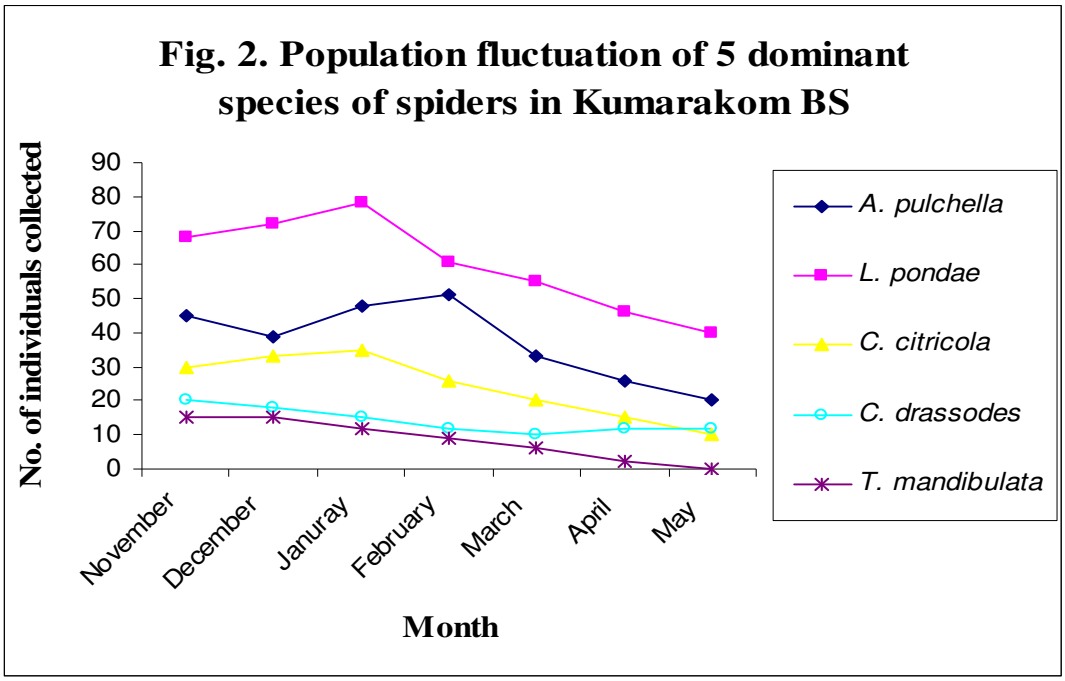


Fig. 2. Population fluctuation of 5 dominant species of spiders in Kumarakom BS
No. of individuals collected
90
80
70
60
50
40
30
20
10
0
November
December
Januray
February
March
April
May
Month
A. pulchella
L. pondae
C. citricola
C. drassodes
T. mandibulata

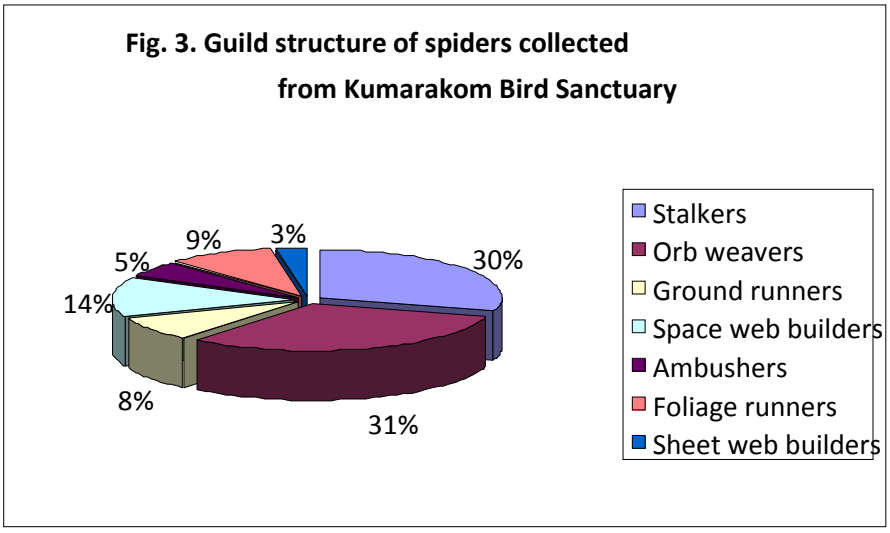


Fig. 3. Guild structure of spiders collected from Kumarakom Bird Sanctuary
30%
31%
8%
14%
5%
9%
3%
Stalkers
Orb weavers
Ground runners
Space web builders
Ambushers
Foliage runners
Sheet web builders